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METHODS ARTICLE

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The effect of administration mode on CAHPS survey response rates and results: A comparison of mail and web-based approaches

Floyd J. Fowler Jr PhD[1] | Carol Cosenza MSW[1] | Lauren A. Cripps MA[2] | Susan Edgman-Levitan PA[3] | Paul D. Cleary PhD[4]

[1]Center for Survey Research, UMass Boston, Boston, Massachusetts

[2]Healthcare Research in Pediatrics, Harvard Pilgrim Health Care, Boston, Massachusetts

[3]John D Stoeckle Center for Primary Care Innovation, Massachusetts General Hospital, Boston, Massachusetts

[4]Department of Health Policy and Management, Yale School of Public Health, New Haven, Connecticut

Correspondence
Floyd J. Fowler Jr, PhD, Center for Survey Research, UMass Boston, Boston, MA.
Email: floyd.fowler@umb.edu

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Objective: The objective of this study was to compare response rates, respondents' characteristics, and substantive results for CAHPS surveys administered using web and mail protocols.

Data Sources: Patients who had one or more primary care visits in the preceding 6 months.

Study Design/Data Collection Methods: Patients for whom primary care practices had email addresses were randomized to one of four survey administration protocols: web via a portal invitation; web via an email invitation; combination of web and mail; and mail only. Another sample of patients without known email addresses was surveyed by mail. Samples of nonrespondents to the Internet and mail protocols were surveyed by telephone.

Principal Findings: Response rates to surveys administered using the Internet protocols were lower than for the surveys administered by mail (20 percent vs over 40 percent). However, characteristics of respondents and survey answers were very similar across protocols. Respondents without email addresses were older, less educated, and more likely to be male than those with email addresses, and there were a few differences in their responses. There was little evidence of nonresponse bias in either the mail or web protocols.

Conclusion: In this well-educated patient population, web protocols had lower response rates, but substantive results very similar to those from mail protocols.

KEYWORDS
CAHPS, internet surveys, mode of data collection, nonresponse bias

1 | BACKGROUND

Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys are now routinely conducted by health plans, the Center for Medicare & Medicaid Services (CMS), hospitals, clinical sites, most states (for their Medicaid beneficiaries), and others in order to collect data about patient experiences with their medical care.[1] The recommended protocol for administering CAHPS surveys uses mail as the initial data collection mode, with follow-up telephone calls to interview mail nonrespondents.

Minimizing the costs of CAHPS surveys is of great interest to many users. One way to reduce costs is to try to induce as many respondents as possible to do the survey on the Internet. There have been at least two experiments comparing the Internet and mail for CAHPS surveys.[2] In those experiments, Internet protocols had lower response rates than mail protocols. Since those studies were conducted, however, the expansion of Internet access and the increasing use of patient portals may have changed the potential of the Internet to be an effective way to conduct CAHPS surveys. Furthermore,

nonrespondents to an email request can be recontacted by mail and sent a paper questionnaire. Doing this has consistently been found to increase response rates over Internet modes alone. Offering respondents a simultaneous choice between web and mail modes consistently has been found to get lower response rates than mail alone.[3] However, when modes are offered sequentially, with web first, the gaps have been found to be smaller, though the tendency still seems to be for mail alone to get the better response rates when there is a difference.[4,5]

To assess the potential of Internet administration in this rapidly changing environment, we conducted a study to address several questions about how best to do an Internet CAHPS survey and how the results would compare with a mailed survey. We collaborated with three primary care practices in the Greater Boston area with a common patient portal to address four goals:

1. To compare the results from the mail and Internet protocols, we assessed the sociodemographic characteristics of respondents to Internet and mail protocols and whether substantive survey response patterns differed between these methods of survey administration.
2. For patients who have a portal through which they can communicate with providers, a request for a survey can be handled in different ways. For example, an email can direct patients to the patient portal, where they can open a letter explaining the survey and providing a link to a survey. The cover letter and link can also be provided in the original email, without asking patients to go through the portal. One hypothesis was that going through the patient portal might adversely affect response to the survey request. A second goal was to learn whether approaching patients through a patient portal affects response rates, who responds, or the survey results.
3. A major concern with protocols that use only Internet responses is leaving out those people for whom an email address is not available. Thus, another goal of this study was to compare the characteristics and responses of those with and without email addresses.
4. Finally, we wanted to assess the nonresponse bias associated with the mail and Internet protocols.

2 | METHODS

2.1 | Sites

We conducted the study in three hospital-affiliated primary care practices in a suburb of Boston, Massachusetts. All the patients in those practices had access to a patient portal, and about 85 percent had registered to use the portal. With a user name and password, patients could enter the portal to send and receive messages, make and review appointments, and see test results. The standard procedure for the practices was for the provider to send patients an email message telling them to go to a portal to view a message.

2.2 | Subjects

Eligible subjects were patients age 18 or older who had at least one primary care visit during the 6 months preceding the survey. For each of the three practices, we identified eligible patients and divided them into two groups: those who had signed up for the patient portal for whom providers had an email address (about 85 percent of all patients) and those who had not. The decisions on the sample sizes were based on what we thought we would need to reliably compare the results from the different protocols and to compare the practices, given the wide range of response rates that we expected. The number of patients meeting selection criteria within the 6-month reference period and the costs of follow-up of nonrespondents also influenced the sample design.

Patients were sampled without replacement. In the two larger practices, samples of 400 eligible patients for whom the practices had email addresses were randomly assigned to one of the four protocols (A-D) described below. In the smaller practice, because there were fewer eligible patients, samples of 400 patients were only assigned to Protocols A, B, or D. Then, within each practice, random samples of 400 eligible patients for whom the practices did not have an email address were selected and assigned to protocol E.

2.3 | Data collection protocols

A. Internet: Link through portal: Patients were sent an email telling them that they had a new message in their portal.

- **a**. The message explained that they had been randomly selected to provide feedback on their recent care experience, assuring them of confidentiality, and providing a link to a site where they could complete the survey.
- **b**. A second email was sent to everyone a week later, reminding them to do the survey and thanking them for their participation if they had already completed the survey, although in one practice, due to a technical error, the second email was not sent.

B. Internet: Link without using portal. Patients were sent an email that was similar to the letter patients received through their portal in Protocol A, except that the salutation to the email was personalized. The link to the survey was included in the initial email letter. Patients did not have to go to the portal to read the cover letter or to link to the survey URL.

- **a**. Nonrespondents were sent a reminder email 1 week after the initial email.
- **b**. A second reminder email was sent 1 week later.

C. Sequential web-mail protocol, with Internet link followed by mail to nonrespondents. Patients were sent a prenotification letter by mail telling them they would soon receive an email request to do a survey about their medical care experiences. No mention was

made of the fact that, at some point, they would receive an option to respond on a paper questionnaire.

   a. As with Protocol B, patients were sent a personalized email message with the link to participate in the online survey.
   b. One week after that email, nonrespondents were sent a reminder email.
   c. Those who did not respond after the initial mail and two email requests were sent a paper questionnaire by mail, with a cover letter and a postage-paid envelope in which to return the questionnaire.

D. Mail only (to those with an email address). Patients were mailed a cover letter, paper questionnaire, and postage-paid return envelope.

   a. Reminder postcards were sent to everyone 2 weeks later.
   b. Two weeks later, nonrespondents were mailed another questionnaire. This is the standard CAHPS mail protocol.

E. Mail only (to those without an email address): Patients for whom there were no email addresses were sent paper questionnaires and reminders following the exact same procedures used in Protocol D.

To compare the patterns of nonresponse to the Internet and mail protocols, samples of 685 nonrespondents to Protocol B and 573 nonrespondents to Protocol D were selected, and we attempted to interview them by telephone. Phone numbers were available for over 98 percent of nonrespondents. Professional interviewers called nonrespondents from a call center up to six times on different days of the week and different times of day attempting to interview them.

2.4 | The survey

The survey was a standard CG-CAHPS (Clinician and Group CAHPS) survey that included the Patient-Centered Medical Home (PCMH) supplemental item set designed to assess patient experiences with the domains of primary care that define a medical home.[6] In total, there were 56 questions, including ones that asked about respondent characteristics. Questions about conceptually related issues were added to form a score for composite measures assessing ability to get timely appointments, effective clinician communication, how helpful and courteous staff were, and the clinicians' use of information. The PCMH measures were single questions about whether patients were given information about after hours care, whether the provider was informed about care received from specialists, and whether the provider asked about patients' stress, plus a two-item composite on whether patients had been asked about their specific health goals and things that make it hard for them to take care of their health. In addition, respondents were asked to rate their clinician on a 0-10 scale where 10 represents the best possible clinician. Questions within each composite were averaged to calculate composite scores. The four composites and the clinician rating, which are the measures recommended for use by AHRQ, plus the PCMH measures are the main foci of our analysis.[7] In addition, we analyzed four individual items about topics discussed with the provider plus a 3-item Shared Decision Making composite for those who discussed starting or stopping a medication.

The paper questionnaire was 12 pages, including a cover page and unused back page. The layout of the Internet version was as close as possible to the paper version. The exact wording of questions and the combinations of questions used in composite measures are in the Appendix S1.

2.5 | Analyses

For these analyses, we combined the data from the three practices and weighted the data by the inverse of the probability of selection to adjust for differences in the practice sizes. For the analyses that include the telephone responses, we also weighted the data to adjust for the subsampling of nonrespondents.

2.5.1 | Analysis 1—Comparing web and mail protocols

We compared response rates, respondent characteristics, and CAHPS results between Internet-only, a combination of Internet and mail, and the mail only protocols (Protocols B, C, and D).

2.5.2 | Analysis 2—Comparing Internet survey protocols that do and do not use patient portals

We compared response rates, respondent characteristics, and CAHPS results between Internet protocols going through the portal and those that did not involve a portal (Protocols A and B).

2.5.3 | Analysis 3—Comparing those for whom there were and were not email addresses

We compared response rates, respondent characteristics, and CAHPS results for those surveyed by mail for whom providers did and did not have email addresses (Protocols D and E).

2.5.4 | Analysis 4—How nonrespondents compare with Internet and mail respondents

We compared respondent characteristics and CAHPS results from the initial survey returns and those of nonrespondents to Internet and mail protocols (Comparing phone survey results with nonrespondents to results from respondents to Protocols B and D).

We present two statistics: the percentages of respondents who, for example, were older than 65 or who said their providers asked them about stress and the mean scores of the CAHPS composites or ratings, standardized to range from 0 to 100. The principle tests for statistical significance used were t-tests for differences between percentages or between means.

The study protocols were approved by the relevant IRBs of the participating organizations.

TABLE 1 Comparisons of survey administration protocols

	Protocol B: Internet: Email with direct link to survey	Protocol C: Combination: Email with direct link to survey then mail follow-up	Protocol D: Mail only
Response rate[a] (*sample size)	20% (n = 1186)	41% (22% by web alone) (n = 782)	43% (n = 1176)
Demographics			
Age: % Over 65	46% (n = 235)	44% (n = 310)	43% (n = 503)
Education: % BA or higher	75% (n = 236)	73% (n = 309)	75% (n = 499)
Race: % White non-Hispanic	92% (n = 231)	94% (n = 303)	94% (n = 487)
Gender: % Female	62% (n = 236)	69% (n = 310)	63% (n = 502)
CAHPS measures			
Timely appointments (composite mean)	85 (n = 119)	82 (n = 157)	84 (n = 240)
Effective communication (composite mean)	95 (n = 237)	95 (n = 311)	95 (n = 501)
Helpful and courteous staff (composite mean)	91 (n = 235)	90 (n = 310)	90 (n = 504)
Providers use of information (composite mean)	88 (n = 229)	86 (n = 302)	87 (n = 480)
Rating of provider (standardized mean)	92 (n = 232)	92 (n = 311)	91 (n = 500)
PCMH measures			
% Given information about after-hours care	65% (n = 230)	63% (n = 297)	65% (n = 479)
% Provider always informed about specialist care	71% (n = 149)	68% (n = 185)	69% (n = 279)
% Provider asked about stress	67% (n = 234)	67% (n = 308)	61% (n = 492)
Self-Management Support (composite mean)	53 (n = 234)	52 (n = 311)	50 (n = 494)

Note: (n) Unweighted number of cases on which estimates are based.
[a]Protocol B is different from both Protocols C and D; $P < 0.001$.

3 | RESULTS

3.1 | Comparing web and mail protocols

The data in Table 1 indicate that the mail protocol alone (Protocol D), or when it was used as a follow-up to nonrespondents to Internet requests (Protocol C), had response rates that are twice as high as the Internet alone (Protocol B).

In Protocol C, an advance letter was mailed to respondents before they received the email request. The two percentage point difference in the percentage responding via Internet (Protocol B vs web responses to Protocol C; 20 percent vs 22 percent) is not statistically significant and suggests that there is only a small, if any, effect of an advance letter. A second question is whether the combination of Internet followed by mail is better, worse, or the same as mail alone. The overall response rate was 2 percentage points (nonsignificantly) lower for C than D, suggesting that the sequenced combination approach has about the same response rate as mail alone.

There are no statistically significant differences among the three protocols in the characteristics of those responding or in any of the substantive results of the survey about their health care experiences.

3.2 | Comparing Internet survey protocols that do and do not use patient portals

Table 2 shows that the response rate for those responding through the portal was only slightly lower than for those who received an email from which they could go directly to the survey site (Protocol A vs Protocol B; 17 percent vs 19 percent). Moreover, as noted above, there was one practice in which potential respondents to Protocol A did not receive a second email reminder. Hence, the results do not support the idea that going through the patient portal reduces response rates.

Table 2 also compares the answers from those who responded by web and had to go through a portal with those who responded by web in response to an email without going through the portal. The only significant difference is that those over 65 were significantly ($P < 0.05$) less likely to respond when they had to go through a portal than when they could go directly to the survey from the email request. There also is a nonsignificant tendency for those responding through the portal to be more educated than those who responded to the direct email. The other two demographic characteristics, race and gender, do not differ by whether respondents had to use the portal.

None of the four basic CAHPS composites, the provider rating, nor the four PCMH measures is significantly different between Protocol A and Protocol B.

3.3 | Comparing those for whom there were and were not email addresses

Table 3 compares the results from those for whom providers did and did not have email addresses. The latter group would necessarily be excluded if an Internet-only protocol was used.

TABLE 2 Comparing results from internet protocols

	Protocol A: Internet: Survey link through portal	Protocol B: Internet: Email with direct link to survey
Response rate (*sample size)	17% (n = 1192)	20% (n = 1186)
Demographics		
Age: % Over 65[a]	35% (n = 205)	46% (n = 235)
Education: % BA or higher	81% (n = 203)	75% (n = 236)
Race: % White non-Hispanic	94% (n = 200)	92% (n = 231)
Gender: % Female	65% (n = 204)	62% (n = 236)
CAHPS measures		
Timely appointments (composite mean)	80 (n = 112)	85 (n = 119)
Effective communication (composite mean)	94 (n = 205)	95 (n = 237)
Helpful and courteous staff (composite mean)	86 (n = 205)	91 (n = 235)
Providers use of information (composite mean)	85 (n = 200)	88 (n = 229)
Rating of provider (standardized mean)	91 (n = 205)	92 (n = 232)
PCMH measures		
% Given information about after-hours care	58% (n = 199)	65% (n = 230)
% Provider always informed about specialist care	66% (n = 125)	71% (n = 149)
% Provider asked about stress	66% (n = 200)	67% (n = 234)
Self-Management Support (composite mean)	54 (n = 200)	53 (n = 234)

Note: (n) Unweighted number of cases on which estimates are based.
[a]Protocol A is different from Protocol B; $P < 0.05$.

Those who do not have or did not give their providers an email address were less willing to do a survey about their medical care than those for whom there was an email address. The difference was six percentage points (37 percent vs 43 percent, $P < 0.05$).

There are also highly significant differences in the characteristics of the two groups of respondents. Those in the no email group were much more likely to be over 65 (68 percent vs 43 percent), much less likely to be college graduates (40 percent vs 75 percent), and more likely to be male (63 percent vs 56 percent) Yet, despite those large differences, there is only one substantive measure for which there was a difference between the responses of the two groups: whether or not they said they were asked about stress during their last visit to their providers ($P < 0.01$).

3.4 | How nonrespondents compare with Internet and mail respondents

The response rate for Protocol B, which used the Internet, was 20 percent compared with 43 percent for Protocol D which used mail (Table 1). Given such a large difference, one might expect more error due to nonresponse in the web survey results than in those based on the mail protocols. Samples of nonrespondents to each protocol were interviewed by telephone. Telephone response rates were 22 and 20 percent for Protocols B and D, respectively. Table 4 compares the results from respondents to Protocols B and D with the results of telephone interviews of the nonrespondents from each protocol.

There are only two comparisons in the table that are statistically significant—both in Protocol D (mail only). Those who responded by mail were older than those in the nonrespondent sample ($P < 0.001$). There was also a small, nonsignificant difference in the same direction between the Internet respondents and the nonrespondents.

The mail respondents also were significantly higher than the nonrespondent sample with respect to the "Use of Information" composite ($P < 0.05$). Other than those differences, there was no evidence of nonresponse bias in either the Internet or mail samples.

3.5 | Supplemental analyses

Because of the importance of the finding that there were almost no differences in the substance of answers, despite the difference in response rates, we repeated the comparisons in Tables 1-3 for five other measures included in the CAHPS survey: four items about that discussed with providers and a measure of Shared Decision Making when there was discussion of starting or stopping a prescription medicine.

When Protocols B, C, and D were compared (cf. Table 1), the mixed mode Protocol C differed from the Internet sample and the mail only sample in that they were more like to say they had been asked about possible depression. There were no other differences that were close to statistical significance.

The web respondents who went through the patient portal reported more shared decision-making when they discussed medications than those who did not go through the portal (cf. Table 2).

When we compared the mail survey responses for those who did and did not provide email addresses (cf. Table 3), two of the five

TABLE 3 Comparing respondents with and without email addresses

	Protocol D: Mail only: Those with an email address	Protocol E: Mail only: Those without an email address
Response rate[a] (*sample size)	43% (n = 1176)	37% (n = 769)
Demographics		
Age: % Over 65[c]	43% (n = 503)	67% (n = 278)
Education: % BA or higher[c]	75% (n = 499)	40% (n = 272)
Race: % White non-Hispanic	94% (n = 487)	90% (n = 262)
Gender: % Female[a]	63% (n = 502)	56% (n = 275)
CAHPS measures		
Timely appointments (composite mean)	84 (n = 240)	84 (n = 149)
Effective communication (composite mean)	95 (n = 501)	92 (n = 277)
Helpful and courteous staff (composite mean)	90 (n = 504)	90 (n = 277)
Providers use of information (composite mean)	87 (n = 480)	86 (n = 259)
Rating of provider (standardized mean)	91 (n = 500)	91 (n = 276)
PCMH measures		
% Given information about after-hours care	65% (n = 479)	65% (n = 261)
% Provider always informed about specialist care	69% (n = 279)	67% (n = 141)
% Provider asked about stress[b]	61% (n = 492)	49% (n = 268)
Self-Management Support (composite mean)	50 (n = 494)	49 (n = 267)

Note: (n) Unweighted number of cases on which estimates are based.
[a]Protocol D is different from Protocol E; $P < 0.05$.
[b]Protocol D is different from Protocol E, $P < 0.01$.
[c]Protocol D is different from Protocol E; $P < 0.001$.

comparisons were statistically significant. Those who had not provided email addresses were less likely to say that their providers had discussed their medications and asked about possible depression. These results add to the findings reported in Table 3 that they were less likely to report that their providers had asked them about stress.

These supplemental results are presented in the Appendix S1.

4 | CONCLUSION

This project was designed to assess the implications of doing CAHPS surveys using the Internet rather than the standard CAHPS protocol that relies primarily on mailing paper surveys.

Our results are consistent with the finding in the literature that mail surveys get much better response rates than Internet surveys, whether it is a CAHPS survey[2] or other surveys.[5,8-11] In this study, the mail protocol yielded more than twice the response rate of the web approach. Moreover, several other studies have found that pairing mail and Internet as options for responding can result in lower response rates than mail alone,[3,9] though the literature is not completely consistent.[12] We found a slight decrease in response rate when we first offered the Internet option alone and followed up by offering a mail option to Internet nonrespondents. However, others generally have found that Internet respondents are younger and more educated than mail respondents.[2] We observed neither of those differences. Perhaps most surprising, despite the marked differences in response rates, there were no statistically significant differences in the CAHPS measures of patient experience between Internet respondents and the mail respondents. The only significant difference in supplemental analysis was that the combined protocol differed from the mail only and web only responses in one question.

Several studies have found that the effect of nonresponse on estimates is highly variable, depending on the topic, and that there is not a consistent association between response rates and the representativeness of the sample.[13-15] These data suggest that the drivers of differences in response between those using the web and those responding by mail may not be strongly related to the substantive answers to CAHPS surveys.[2] Several studies have had similar findings when they compared web and mail protocols.[16,17]

All of the patients in the main experiments were signed up to use a patient portal, and we tested whether having the patients receive the survey request and survey link through the portal affected results compared with having the request come via email without using the portal. In general, the answer was "no." The only significant difference observed was that the portal respondents were younger. There were no substantive differences in the CAHPS measures that are typically reported, although there was one significant difference for the other measures.

A concern about using the Internet to conduct surveys is that patients for whom providers lack an email address are left out of the survey. Like others, we found that those lacking email addresses were significantly older and less likely to be college graduates. We also found them to be more likely to be male than the patients for

TABLE 4 Comparing results from internet and mail protocols with results from telephone interviews with nonrespondents

	Protocol B: Internet: Email with direct link to survey	Telephone Interviews with Protocol B nonrespondents	Protocol D: Mail only	Telephone Interviews with Protocol D nonrespondents
Demographics				
Age: % Over 65[a]	46% (n = 235)	39% (n = 147)	43% (n = 503)	15% (n = 111)
Education: % BA or higher	75% (n = 236)	70% (n = 145)	75% (n = 499)	76% (n = 113)
Race: % White non-Hispanic	92% (n = 231)	90% (n = 145)	94% (n = 487)	88% (n = 108)
Gender: % Female	62% (n = 236)	65% (n = 148)	63% (n = 502)	62% (n = 114)
CAHPS measures				
Timely appointments (composite mean)	85 (n = 119)	81 (n = 71)	84 (n = 240)	81 (n = 51)
Effective communication (composite mean)	95 (n = 237)	94 (n = 148)	95 (n = 501)	95 (n = 114)
Helpful and courteous staff (composite mean)	91 (n = 235)	89 (n = 148)	90 (n = 504)	85 (n = 112)
Providers use of information (composite mean)[b]	88 (n = 229)	87 (n = 138)	87 (n = 480)	80 (n = 97)
Rating of provider (standardized mean)	92 (n = 232)	90 (n = 148)	91 (n = 500)	90 (n = 114)
PCMH measures				
% Given information about after-hours care	65% (n = 230)	63% (n = 135)	65% (n = 479)	64% (n = 107)
% Provider always informed about specialist care	71% (n = 149)	63% (n = 76)	69% (n = 279)	61% (n = 61)
% Provider asked about stress	67% (n = 234)	57% (n = 144)	61% (n = 492)	59% (n = 112)
Self-Management Support (composite mean)	53 (n = 234)	47 (n = 148)	50 (n = 494)	49 (n = 114)

Note: (n) Unweighted number of cases on which estimates are based.
[a]Protocol D nonrespondents are different from Protocol D mail respondents; $P < 0.001$.
[b]Protocol D nonrespondents are different from Protocol D mail respondents; $P < 0.05$.

whom there were email addresses. When we surveyed them by mail, there was only one statistically significant substantive difference in answers between those for whom there were and were not email addresses among our primary measures. However, when we looked at additional measures, we found two more questions for which the responses from those without email were different. Moreover, the differences observed were that those lacking email were less likely to say that their providers had talked to them about their medications, stress, and possible depression. These results suggest that those who do not provide an email address may have some different patterns of provider experience.

In this setting, if a CAHPS survey had been done solely via the Internet, the response rate would have been much lower, around 20 percent, and about 15 percent of the patients would have been left out of the sample because they had not provided an email address. However, the substantive results would have been essentially identical to those from a mail survey that gave all patients a chance to respond. The small number of "statistically significant" differences observed could easily be explained by chance, given the large number of comparisons that were done. Moreover, consistent with that result, interviews with nonrespondents to the mail and Internet protocols provided no evidence of differential nonresponse error in the Internet protocol.

There are several potential limitations to this study. The patients in this population were very well educated as a group: over 70 percent had graduated from college. About 90 percent were non-Hispanic whites. Consistently, over 80 percent had enrolled in the patient portal program and had provided an email address. In a population that was less educated and less comfortable with using the Internet, the results might have been different. Moreover, while leaving out those lacking an email address would not have had much effect on the primary measures we examined, our supplemental runs suggested the potential for their answers to be different, depending on the topics covered. These findings help to emphasize the obvious point that the potential effect of leaving out those lacking emails depends on the percentage of the sample in that category. They also illustrate that the potential for error due to nonresponse or sample limitations can vary depending on the content of the questions.

Another issue is that these providers were generally well regarded by their patients. The average physician rating was over 9 using a scale from 0 to 10. Our results might be different in a setting in which there was more variability in the quality of patient experience.

Finally, we should note that the standard CAHPS protocol calls for mail followed by telephone follow-up of nonrespondents. We did not explicitly focus on what role the telephone could play, as the Internet options were our main focus. However, our telephone surveys of nonrespondents did show that they would not have changed the results of either the Internet or mail protocols alone, although they would raise the effective response rates.

Based on these data, we conclude that for a population that is well educated and in which most people have email, an Internet-based CAHPS survey will have lower response rates but still could yield very similar estimates to those produced by a mail protocol. The fact that collecting data via the Internet is considerably less expensive than doing postal surveys or telephone interviews and also can allow for a shorter data collection period makes maximizing the use of the Internet very attractive. However, because of the indications that those lacking email addresses may be different and because of legitimate concerns about the credibility of data based on low response rates, following Dillman,[18] we think a better recommended protocol would work not only to maximize the use of the web for responding but also provide a way for those who do not respond, particularly those without emails, an alternative way of responding.

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ORCID

Floyd J. Fowler Jr https://orcid.org/0000-0001-5889-6362
Paul D. Cleary https://orcid.org/0000-0001-7527-4354

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of the article.

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